

<u>Report of the 26th meeting of the Informal Working Group on Functional Requirements for Automated and Autonomous Vehicles (IWG FRAV)</u>	
Venue	Web conference
Date	15-16 March 2021
Documents	Submissions can be found on the FRAV wiki page for the session .
Status: Draft	

<i>Agenda adopted.</i>	FRAV adopted the draft agenda (FRAV-05-01-Rev.2) without change. FRAV also adopted the draft report of the previous session (FRAV-04-02) without change.
<i>Information-only FRAV document.</i>	FRAV agreed to continue developing its draft recommendations (based on FRAV-26-05 as of the session) for submission to GRVA as informal documents for information only.
<i>FRAV to provide view on external light-signaling of ADS operational status by November 2022.</i>	<p>The chair of GRVA informed FRAV that WP.29/AC.2 has mandated FRAV to provide guidance on possible external light-signaling recommendations for ADS vehicles by the November WP.29 session. Under this mandate, FRAV is requested to determine whether one or more safety needs exists for ADS-specific external signaling and, if yes, to describe the nature and purposes of such signaling. In particular, this mandate should address the interests of GRE and the Automated Vehicle Signaling Requirements (AVSR) task force.</p> <p>FRAV has previously discussed the interest of law enforcement in being able to determine whether a vehicle is under ADS control. FRAV noted that information could be furnished via communications technologies. FRAV also noted concerns that behaviors of other road users (ORU) could be adversely impacted based on knowledge that a vehicle is under ADS control. FRAV noted that deaf and/or blind ORU may have specific needs. FRAV referred this mandate to the ORU workstream to provide FRAV with further input and recommendations, starting with identification of any safety needs.</p>
<i>FRAV deprecated the term "dynamic control".</i>	<p>FRAV agreed to remove the term "dynamic control" from its recommendations document (FRAV-26-05). The term originated with the Global Forum for Road Traffic Safety (WP.1). FRAV has defined the term "Dynamic Driving Task" (DDT) based on SAE/ISO standards. Both terms have similar definitions that seem aimed at the same concepts (and FRAV has further elaborated DDT to ensure clarity). FRAV noted that the term "control" has a specific functional meaning and the intent of the WP.1 definition was unclear. FRAV agreed that DDT has been defined for technical precision and clarity and covers dynamic control.</p> <p>FRAV noted discussions between the chair of GRVA and WP.1 towards facilitating exchanges regarding driving automation. FRAV agreed that the use of uniform terminology across the activities would be beneficial. FRAV suggested that the terms "DDT" and "fallback user" would be useful in aligning WP.29 and WP.1 work related to driving automation.</p>

<p><i>Consideration of ADS safety maintenance issues to be continued pending VMAD ISMR activities and related discussions.</i></p>	<p>FRAV recalled previous discussions on the starting point concerning ADS maintenance of a safe operational state. This element was derived from the WP.29 AV Framework Document (WP.29/2019/34/Rev.1). FRAV has not yet fully discussed technical provisions under this starting point and some experts questioned its scope and purpose.</p> <p>FRAV noted the VMAD work on In-Service Monitoring and Reporting and technical workshops on in-service safety performance organized by SG3 to exchange information with FRAV, EDR/DSSAD, and the ITU-T Focus Group on Artificial Intelligence for Autonomous and Assisted Driving (FG-AI4AD). The FRAV starting point may be relevant to the VMAD in-use performance interests as well as the EDR/DSSAD work on data collection and storage. The activities relate to ADS safety after validation at the time of certification/approval.</p> <p>FRAV agreed to continue consideration of the starting point regarding maintenance of a safe operational state.</p>
<p><i>UK to present detailed explanation of its work on the derivation of ADS performance criteria based on natural language rules of the road.</i></p>	<p>The expert from the UK recalled previous discussions on the development of verifiable requirements from natural language rules of the road (FRAV-17-14 and -15). The expert presented FRAV-26-11 to update FRAV on the status of work to derive requirements from traffic rules. The expert anticipated providing a more detailed presentation at the next FRAV session. FRAV welcomed the input, noting that the process could be especially useful in addressing the general requirement that ADS shall comply with traffic laws. The expert from Japan raised concern that the approach might involve interpretation of traffic rules which falls under the competence WP.1. The UK agreed that WP.1 provides the traffic rules from which verifiable performance criteria can be derived, including for use in driver models.</p> <p>FRAV agreed to allocate time for this presentation during its 27th session in April.</p>
<p><i>FRAV supported BAST views on the path towards the development of verifiable criteria for DDT performance based on driving models.</i></p>	<p>The expert from BAST presented a “vision for FRAV final steps” (FRAV-26-07). The presentation suggested a process for achieving FRAV’s objective to establish verifiable criteria for assessing compliance with ADS safety specifications. FRAV has established a number of specifications. Some specifications can be verified; however, some specifications require additional information (assumptions) to be verifiable. In some cases, the specifications (such as avoiding collisions where possible) are not verifiable in their current form.</p> <p>BAST noted FRAV discussions of various performance models. These models provide a basis for determining pass/fail criteria without prescribing specific vehicle behaviors in the safety specifications. The models provide a proxy for expected behaviors under assumptions and parameters relevant to the specific ODD and traffic situation. The models establish thresholds for performance expectations while enabling application across diverse ODD conditions without prescribing a specific solution (technological or behavioral) for achieving the outcome.</p> <p>The expert from NTSEL stressed that the models should produce technology-neutral verifiable criteria that are independent of the control methods used by the ADS under evaluation. NTSEL believed that the “Careful and Competent Driver” and “State of the Art” models were aligned with this principle. The expert from ETSC suggested that the models may also be relevant to the VMAD assessment methods.</p> <p>FRAV referred the proposal to the DDT performance workstream for further discussion and suggested applying the UK and BAST proposals to specific scenarios.</p>

<p><i>FRAV agreed to illustrate its recommendations for ADS data collection based on the example of transitions of control</i></p>	<p>FRAV considered the proposal from the ADS data collection workstream (presented previously as FRAV-25-10) to illustrate the FRAV recommendations to the EDR/DSSAD informal group with the example of transitions of control (TOC). EDR/DSSAD had requested such an example in response to the recommendations document (FRAV-18-07). TOC are only applicable to ADS designed to permit transfers of control between the ADS and a user while the vehicle is in motion. TOC has sequences of elements such as initiation, verification of user inputs, and outcome. For example, TOC may be initiated by a fallback user or by the ADS and they may be successful or unsuccessful (resulting in a fallback to a minimal risk condition), so individual TOC sequences may differ. TOC data may be applicable in crash investigations and in evaluating ADS in-service performance generally. Therefore, as recommended by FRAV, EDR/DSSAD work on ADS data recording and storage should aim to account for diversity and uses of TOC data and ensure that data requirements can be objectively applied to specific ADS configurations and use cases.</p> <p>FRAV approved submission and presentation of the TOC examples to EDR/DSSAD.</p>
<p><i>FRAV discussed changes to the definition of “driver”, agreeing to seek a definition compatible with standards and WP.1.</i></p>	<p>The leader of the FRAV ADS User Safety workstream introduced FRAV-26-06 proposing changes to the FRAV safety recommendations (FRAV-26-05), especially to resolve open item previously identified.</p> <p>FRAV discussed use of the term “qualified” in the definition of “driver”. The workstream concluded that an ADS would not be expected to determine whether a user is qualified to drive. FRAV considered the alternative of “licensed”. FRAV recognized that drivers should be qualified and licensed but agreed that this aspect is governed by road safety laws under WP.1 purview. FRAV agreed to remove the term “qualified”. FRAV noted that WP.1 may wish consider whether driver use of an ADS vehicle requires specific qualifications. FRAV further noted that the “driver” definition uses the term “dynamic control” which has been deprecated (see above).</p> <p>FRAV supported the ISO/SAE definitions (“A user who performs in real time part or all of the DDT and/or DDT fallback for a particular vehicle”); however, FRAV noted that the definition should be consistent with WP.1 definition. The secretary was requested to check the WP.1 definition of “driver”.</p>
<p><i>FRAV agreed that safety recommendations should address fallback-user readiness.</i></p>	<p>FRAV discussed the definition of “fallback user”. FRAV agreed to leave the definition unchanged; however, FRAV stressed that a fallback user must be ready and receptive to ADS requests for intervention. Therefore, the ADS safety recommendations must address risks that a fallback user might not be responsive. The User Safety workstream was requested to ensure attention to this safety need. FRAV experts noted that the safety recommendations should align with the principle that the level of fallback-user readiness is not the same as the level of vigilance required of a driver.</p>
<p><i>FRAV modified the definition of “transition of control”.</i></p>	<p>In the “transition of control” definition, FRAV agreed to remove the word “vehicle”; however, FRAV agreed with the User Safety workstream view that the definition may be subject to further refinement.</p> <p>FRAV-26-06 suggested additional refinements under workstream discussion. In the interests of time, FRAV agreed to leave open further discussion of User Safety workstream proposals to future FRAV session.</p>

<p><i>FRAV discussed results of a China survey on ADS lighting requirements. FRAV agreed to survey experts to gather views on external light-signaling.</i></p>	<p>The leader of the FRAV ORU Safety workstream presented information gathered by CATARC pursuant to a survey of manufacturers on external light signals (FRAV-26-08/Rev.1). The leader proposed to develop a similar survey to gather input across FRAV experts (Contracting Parties, manufacturers, safety experts, etc.).</p> <p>The CATARC survey aimed to identify safety needs, whether ADS vehicle needs differed from conventional vehicle signals, the status of relevant technologies, and the implications for regulatory requirements.</p> <p>At the time of the survey in 2020, the views highlighted potential trade-offs between safety benefits and risks. In general, manufacturers anticipated a need for ADS-specific lighting, but the results were inconclusive on the optimal ways to address safety needs (including the technological solutions). Half of the respondents had already initiated research and development activities in this area.</p> <p>The expert from OICA noted that the views of the respondents to the survey of Chinese manufacturers were not necessarily consistent with views across the global manufacturers represented by his organization. He offered to provide OICA views in further discussions of this issue.</p> <p>The workstream leader noted China’s existing lighting regulations and the potential for conflicts with ADS-specific lighting interests and solutions. The experts from SAE and the USA noted similar provisions in FMVSS that prohibit devices that would interfere with the lighting requirements. The presiding co-chair noted that WP.29 had requested the Working Parties to review current regulations for possible modifications in response to driving automation.</p> <p>The workstream leader requested FRAV experts to provide input towards preparing a survey for FRAV and gathering views to guide the workstream work on a response to the WP.29/AC.2 mandate regarding GRE interest in ADS light-signaling. FRAV agreed that the first step in responding to the GRE interest is to identify any relevant safety needs before discussing technological solutions (e.g., lighting, audible, V2V communication).</p>
<p><i>The ORU workstream explained its intention to focus on human-oriented OEDR before determining whether gaps exist to justify further attention to inanimate objects and animals.</i></p>	<p>The ORU workstream leader presented FRAV-26-10 concerning open issues. The workstream approach is based on object properties, most of which can be generalized. Objects requiring more careful consideration include vehicles and human vulnerable road users (pedestrians, cyclists). Whether inanimate objects or animals require specific classification remains under discussion (i.e., whether the properties identified for human-related objects result a need to address any OEDR gaps in responding to non-human-related objects). Therefore, the workstream is currently focusing on vehicles, pedestrians, and cyclists.</p> <p>The ORU workstream also recommended to change the phrase “in the vehicle’s path” to “in the vehicle’s driving environment” in paragraph 2.6.2.1.2. of the safety recommendations (FRAV-26-05 and FRAV-27-05). The OEDR sensing system should at least determine the driving environment and traffic dynamics (a) across the full width of the vehicle’s traffic lane and the full width of the traffic lanes immediately to left and the right of the vehicle up to the limit of the forward detection range and (b) along the full length of the vehicle and up to the limit of the lateral detection range.</p>

<p><i>The DDT Performance workstream agreed to discuss driving models and the "rules of the road" approaches for verifiable criteria.</i></p>	<p>The leader of the DDT Performance workstream noted the presentations from the UK and BAST (see above) and confirmed his intention to integrate this work into the workstream deliberations. The workstream intends to take a "safety model approach" to provide means to determine verifiable performance criteria.</p> <p>The expert from BAST suggested focusing on the items in red identified in his presentation as needing to be revised to provide a basis for verifiable performance. The DDT Performance workstream leader anticipated such attention to revising the general requirements (including those in yellow).</p>
<p><i>FRAV will hold its 27th session during 19-20 April.</i></p>	<p>The next FRAV session was set for 19-20 April with tentative dates of 19-20 May based on the GRVA calendar. Pending further outcomes from the workstreams, the general aim across the sessions is to update the ADS safety recommendations. A full review of the text and FRAV status report will be conducted during the May session to ensure full FRAV approval.</p>

<p><i>FRAV considered presentations on approaches to defining performance limits.</i></p>	<p>Japan presented its views on overall safety requirements (FRAV-05-04 based on FRAV-04-13). Japan again presented its table for assessing four approaches to setting performance limits based on six criteria (see FRAV-04-02-Rev.1-session report, page 5 for details). In document FRAV-05-04, Japan filled in the table with its assessment of the four approaches.</p> <p>Japan clarified that its C&C Human Driver approach provided measurable performance criteria because it focuses on average human capabilities such as reaction times or brake pedal force inputs, not on driving behaviors that differ across cultures. Japan suggested that the “state-of-the-art” approach could lead to higher ADS prices and lower production by setting performance levels much higher than a diligent human driver level. Japan acknowledged that limits based technological feasibility have some advantages over other methods, but on balance, basing limits on competent and careful human performance levels seems more appropriate. Nonetheless, Japan welcomed information on the various approaches towards finding the optimal approach(es).</p> <p>Germany clarified its comments from the previous session on the “state-of-the-art” approach, demonstrating how existing data could define reasonable limits based on current performance levels (FRAV-05-05). Germany showed how data from Euro NCAP AEBS testing provided objective performance data for various vehicle types with regard to braking. The data quantified performance in terms of delay for threat recognition, brake activation, braking system speed (latency), and deceleration. Germany stressed that the aim of their approach is not to define exact performance limits for the ADS but rather to define the threshold between collision avoidance and crash mitigation (i.e., the point at which a collision can be prevented). Its approach would define parameters for what technical performance can be expected to determine where collisions can be avoided.</p>
<p><i>FRAV agreed to continue considering proposals and presentations on setting performance limits during its next sessions.</i></p>	<p>The Netherlands suggested that one method or the other may not be necessary. Possibly FRAV might use different methods depending upon needs and/or combine methods.</p> <p>Germany requested that the C&C driver model be further explained in terms of its expected results. Germany understood Japan’s presentation to suggest a similarly quantified output as the “state-of-the-art” method. Germany expressed interest to see how the results of the two approaches might compare.</p> <p>FRAV agreed to continue consideration of methods for setting performance limits during its next session. FRAV would like to be fully informed on the options by the time the group has derived performance requirements to the level where quantification becomes the focus.</p>
<p><i>FRAV agreed to hold its next session on 29 October (submissions to be submitted by 27 October)</i></p>	<p>The 6th FRAV session is scheduled for 29 October between 13h00 and 16h00 CET.</p> <p>Stakeholders were requested to provide proposals for the “next-level” performance goals by 27 October to enable preparations for the session. <i>Secretary’s note: Per the discussion, document FRAV-06-04 based on FRAV-05-06 has been circulated to gather input).</i></p> <p>Interested stakeholders were also asked to contribute views on methods for setting performance limits.</p>